§3. Running Status of LMS (LHD Man-machine interface System) in 1st Year LHD Experiment

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LMS is a man-machine interface and a primary component of the central control system for LHD. Here LMS involves a variety of intelligent functions needed in the LHD experiments as well as a scheme of GUI in a narrow sense. LMS system provides a variety of information transmissions through LAN. Major functions of LMS are the following three:

(1) Manipulation of experimental sequence and operational mode management

The duration of discharge, the interval of each pulsed discharge and operational mode transition are set from the graphical terminal by a permitted operator. Sequential procedure of experimental set-up is also managed. Usual users can check the status of LHD experiment on client computers. In LHD, physical acquisition data is managed with an experimental index, so-called Shot Number. It is also managed and LMS serves information of shot number and discharge status to the acquisition systems.

(2) Management of experimental set-up on component devices/facilities

The numbers of subsystem and parameters to be controlled are 30 and more than 300, respectively. The parameters are separated to 2 categories; (1) to be set-up by central operator (2) to be set-up by each device conducted by an individual control computer. Set-up procedure should be done within 90 sec if the set-up data changes every discharge. Within 90s, the candidates of experimental condition are set-up and stored. The set-up data sets are managed with database systems. Scheduling candidates of experimental condition sets is also done.

(3) Supervision of status of component devices/facilities.

This system does not have own data acquisition system but integrate monitoring data from a number of sub-systems through data transmission. Although the data are primarily representing ones to watch status of whole LHD system, the number reaches 3000 in total. When an accident is detected by the central PLC, information related to the cause of the accident is accumulated in detail with this function.

The planning of LMS started at F.Y.1995. It took about 3 years to fix the specification, to examine the performance of basic architecture by prototype systems and make an application code. LHD experiment started at March of 1998. LMS have been applied since the beginning of LHD experiment. In 1st experimental period (1998/3-5), 2 clients, 1 server and 3 controllers of sub-system (PLC of central control system of LHD, ECH and coil power supply) were running. The following functions were running; (1) presentation of status of experimental condition, sequence and events, (2) writing-up and setting-up of experimental condition, (3) supervision of plant data from sub-systems. 2 clients, 1 server and 3 controllers of sub-system were running. In 2nd experimental period (1998/9-12), 8 clients, 2 servers and 6 controllers of sub-system (1st + Gas-puff, pellet and NBI) were running. The following functions were running additionally; (1) management and presentation of experimental condition, (2) distribution of experimental logging data, (3) management of shot number (experimental index).

The development is in progress. There are the following future subjects; (1) addition of connection with more sub-systems, (2) manipulation function of experimental mode transition and experimental sequence, (3) retrieval function of experimental condition, (4) improvement of presentation of status of experiment, (5) improvement of experimental condition management function.

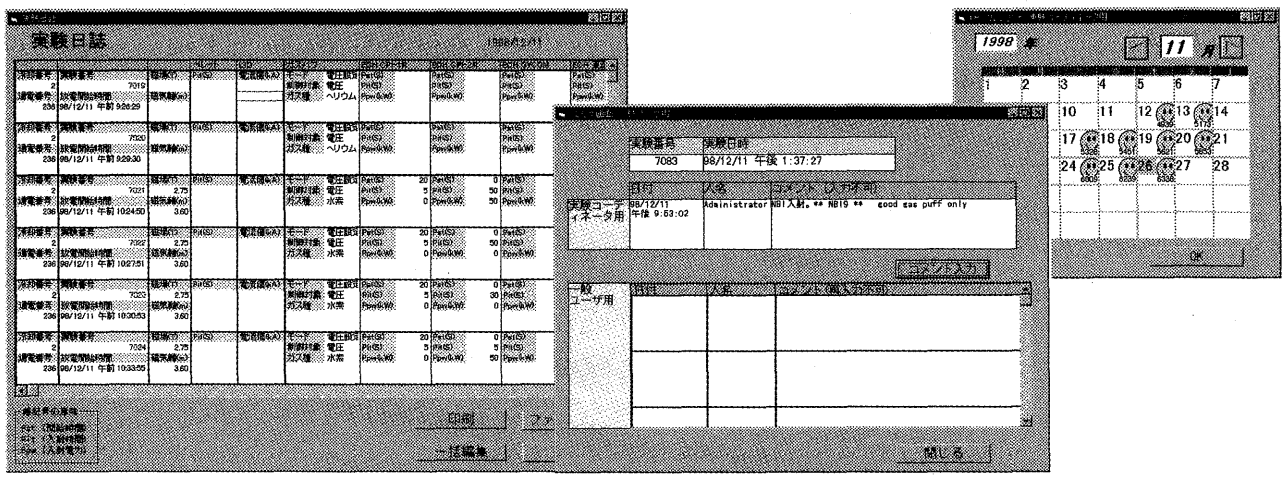

Fig.1 Terminal display format in experimental logging data